

(12) **UK Patent Application** (19) **GB** (11) **2 377 177** (13) **A**

(43) Date of A Publication 08.01.2003

(21) Application No 0116438.3

(22) Date of Filing 05.07.2001

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(51) INT CL<sup>7</sup>  
**A61L 15/00 // A61L 15/60**

(52) UK CL (Edition V )  
**A5R RPC RPK RPR**

(56) Documents Cited  
**GB 2221620 A** **GB 1394742 A**  
**US 5582786 A** **US 5470576 A**  
**US 4392908 A** **US 3661154 A**  
**US 2688586 A** **US 2512616 A**

(58) Field of Search  
**INT CL<sup>7</sup> A61L 15/00 15/60**  
Other: **ONLINE WPI/PAJ/EPODOC**

(54) Abstract Title  
**WOUND DRESSING COMPRISING GEL FORMING AND SUPERABSORBENT LAYERS**

(57) A wound dressing comprising a layer of a low adherent gel forming fabric backed by and in liquid contact with a layer of a material having a superabsorbent component. The gel forming fabric is preferably haemostatic and made from calcium or sodium alginate fibres. It may be woven or knitted but is preferably a non woven, needlepunched fabric of basis weight 25-200 g/m<sup>2</sup>. The alginate web may be medicated or contain therapeutically active metal ions. The superabsorbent component may be a powder or woven material but is preferably a needlepunched or air laid non woven fabric made of polyacrylate fibre, basis weight 50-350 g/m<sup>2</sup>, which may contain anti-bacterial agents. The alginate and superabsorbent layers may be joined by needlepunching or thermal bonding or separated by a permeable fibrous layer. The dressing may include a breathable backing layer and an adhesive layer for attachment to a patient.

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## WOUND DRESSINGS

The present invention relates to wound dressings, in particular to dressings suitable for and advantageous for use on bleeding wounds.

According to the invention, there is provided a wound dressing which comprises a layer of  
5 a low adherent gel-forming fabric backed by a layer of a material having a superabsorbent component. The gel-forming fabric is preferably haemostatic and is more preferably an alginate.

The alginate fabric may be a woven or knitted fabric, but is preferably a nonwoven, e.g. needlepunched, fabric. The basis weight of the alginate fabric is preferably in the range from  
10 25 to 200 grams per square metre, more preferably 50 to 150 grams per square metre, most preferably 75 to 150 grams per square metre.

The alginate fibre in the alginate textile material is typically calcium alginate or sodium calcium alginate. The alginate fibre may contain minor proportions of therapeutically-active metal ions such as zinc or silver. The alginate fibre may be medicated. The titre of the  
15 alginate fibre is preferably in the range from 1.5 to 5 decitex. All such fibres are known and are commercially available.

The superabsorbent component of the material may be in powder form, but is preferably in fibre form, and the material further preferably a fabric. Such a fabric may be a woven or nonwoven fabric, but is preferably a nonwoven, e.g. needlepunched or air-laid fabric. The  
20 basis weight of such a fabric is preferably in the range from 50 to 350 grams per square metre.

The layer of superabsorbent material may contain anti-bacterial agents to restrict odour formation.

The superabsorbent component of the material is preferably a synthetic polymer such as the polyacrylate fibre disclosed in US Patent No 5,582,786, the contents of which are hereby incorporated by this reference. Such material is available from Technical Absorbents Limited under the Trade Mark OASIS.

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In use, the alginate-containing face of the dressing is placed against the wound.

Alginate has haemostatic properties, and accordingly helps to staunch bleeding. Alginate is gel-forming in saline solutions, wound exudate and blood. As is known, alginate dressings  
10 accordingly have low adherence to wounds, and can be easily removed therefrom without causing trauma and without leaving dressing fragments in the wound. However, alginate has a relatively low liquid-holding capacity. Liquid absorbed into an alginate dressing is easily expressed by squeezing.

15 Superabsorbent components have high liquid-holding capacity, often being capable of absorbing several multiples of their own weight of aqueous liquids. It is difficult to express such absorbed liquor. However, superabsorbent materials have high adherence to wounds and are difficult to remove therefrom.

20 The dressings of the invention therefore provide a desirable combination of a layer adapted for wound contact backed by a layer adapted for absorption of liquid.

As already mentioned, alginate is gel-forming. It is well-known that gel-forming substances are prone to gel-blocking, especially when suddenly exposed to large quantities of liquid;  
25 such as blood. In gel-blocking, the part of the substance first exposed to liquid swells so rapidly and extensively that it blocks transmission of liquid to and absorption of liquid by the as yet unwetted parts of the substance. It has surprisingly been found that in the dressings of the invention, liquids such as blood nevertheless can pass through the alginate layer and be absorbed by the superabsorbent layer. Gelling can be a relatively slow process.

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The alginate fabric and the superabsorbent material may be in physical contact or may be separated by a liquid-permeable fibrous layer. It will be appreciated that although the alginate fabric and the superabsorbent material need not be in physical contact, they must be in such contact that liquid can pass between them.

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The dressing may be a unitary fabric formed by needlepunching together webs of alginate fibre and of a fabric containing a superabsorbent fibre.

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The superabsorbent layer may include a low melting point polymer so that the layers can be thermally bonded together, for example by passing them between heated rollers.

The dressing may additionally comprise a liquid-impermeable and breathable backing layer. The dressing may additionally comprise means for attachment to a patient, such as an adhesive layer extending beyond the alginate fabric.

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The wound dressings of the invention absorb blood without leakage, even if applied under pressure.

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The wound dressings are particularly suitable for first aid treatment. They are well suited to use outside a medically-equipped location such as a hospital or surgery. For example, they can be applied to bleeding wounds arising during physical contact sports. They can be applied by unskilled or semiskilled persons. There are nowadays justified fears of contact with the blood of other persons because of the risk of transmission of agents which cause diseases such as hepatitis and HIV syndrome. The dressings of the invention serve both to absorb blood and to staunch blood flow, and thus help minimise such risks.

25

The following g/g saline absorbency results (0.9% NaCl solution) are helpful in order to understand what is meant by the term 'Superabsorbent Fibre' and to distinguish between the fibres of interest.

	Oasis	Hydrocel	Alginate
	Oasis is a Registered Trade Mark used to denote a polyacrylate fibre available from Technical Absorbents Ltd	Hydrocel is a Registered Trade Mark used to denote a carboxy methyl cellulose fibre available from Acordis Speciality Fibres Ltd	
Free swell	45	35	21
Retention (0.5psi)	35	22	11
AUL (0.3psi)	21	10	(no result)
(AUL = absorbency under load)			

Oasis ("superabsorbent" fibre) is also distinguishable in that, once saturated, it can be re-dried to regain its fibrous form. In its saturated form it comprises swollen fibres. Hydrocel and alginate ("gel-forming" fibres) absorb water or saline to become amorphous gel sheets with relatively little fibrous character retained. On drying, they do not regain their fibrous form but produce brittle sheets.

The material according to the invention will now be described with reference to the following Example.

#### **Example**

A composite material comprising a wound contacting layer and a superabsorbent layer. Layer 1, the low adherent wound contact layer, consisted of a gel forming fabric made from calcium alginate fibre (Acordis Speciality Fibres Ltd.). The fabric was manufactured at a basis weight of 70 gsm by a carding and crossfolding technique followed by needlebonding, to confer a degree of integrity to the fabric.

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Layer 2 consisted of a superabsorbent material, designed to absorb and retain large quantities of fluid. The material used was supplied by Lantor (UK) Ltd. and designated as Material

Reference 48-10-12. The material had a basis weight of 190 gsm and was composed of an intimate blend of fibres in the ratio of 40% Oasis superabsorber (Technical Absorbents Ltd.) / 50% viscose / 10% polyolefin.

- 5 Layer 1 and layer 2 were bonded together by passing the two fabrics through a needle loom and needling through layer 1 and down into layer 2.

The conditions used were as follows:

Needle punch density - 80 npsq.cm

Needle penetration - 10 mm

- 10 Throughput speed - 2.5 m/min

The composite fabric was tested for its absorbency and liquid retention in a sodium chloride and calcium chloride solution formed by dissolving 8.298g of sodium chloride and 0.368g of calcium chloride dihydrate in sufficient distilled water to produce 1000 ml of solution.

- 15 Absorbency (free swell) was measured using the BP "Petri Dish" Test for Absorbency of Alginate Dressings (BP 1993 addendum 1995) except that the amount of liquor used was 80 times the weight of the dressing, instead of the standard 40 times, due to the high absorbency of the samples under test.

- 20 Liquid retention was measured as follows: wet samples were taken from the BP "Petri Dish" Absorbency Test and placed on a sheet of absorbent (blue) roll which had been folded in half three times to give a total of 8 layers. A perspex plate and a weight were placed on top to give a total weight of 1358g, which is equivalent to 40 mm Hg, for 1 minute. After this time the weight and plate were removed and the sample re-weighed. Liquid retained by the  
25 sample was then calculated.

Using this method of measurement, the absorbency was measured as 14g/g (46g/100sq.cm) with a liquid retention of 8.5g/g.

- 30 For comparison, a sample of Sorbsan Plus (Maersk Medical Ltd.) comprising a layer of 100

gsm alginate needlebonded to a 330 gsm layer of viscose (also with a 70 gsm polyethylene backing layer) gave 8.5g/g (43g/100 sq. cm) absorbency and 5.0 g/g retention.

## CLAIMS

1. A wound dressing which comprises a wound contacting layer of gel-forming fabric backed by and in liquid contact with a layer of a superabsorbent material.  
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2. A wound dressing as claimed in claim 1 in which the gel-forming fabric is formed from a material having haemostatic properties.
3. A wound dressing as claimed in claim 2 in which the gel-forming fabric is an  
10 alginate.
4. A wound dressing as claimed in any of claims 1 to 3 in which the layer of superabsorbent material is a layer of fabric, the fabric being formed at least in part from superabsorbent fibres.  
15
5. A wound dressing as claimed in any of claims 1 to 4 in which the superabsorbent material is formed of superabsorbent fibres, which fibres absorb at least 40 g of saline solution per gram of fibre in the unrestrained state.
- 20 6. A wound dressing as claimed in any of claims 1 to 5 in which the gel-forming fabric is formed of gel forming fibres, which fibres absorb at least 20 g of saline solution per gram of fibre in the unrestrained state.





INVESTOR IN PEOPLE

**Application No:** GB 0116438.3  
**Claims searched:** 1-6

**Examiner:** Dr R.A. Lewis  
**Date of search:** 24 January 2002

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.T):

Int Cl (Ed.7): A61L15/00, A61L15/60

Other: Online PAJ/WPI/EPODOC

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
X	GB2221620 A (JOHNSON AND JOHNSON PATIENT CARE INC) see page 1 lines 1-7; page 3 lines 11- column 4 line 10.	1-4
Y	GB1394742 (MEDICAL ALGINATES LTD) see whole document	1-3, 5 and 6
Y	US5582786 A (BRUNSKILL ET AL) see whole document	1-3, 5 and 6
X	US5470576 A (PATEL) see column 5 lines 11-27; column 7 lines 3-16.	1-4
Y	US 4392908 (DEHNEL) see column 1 line 59-column 2 line 34 and column 3 lines 31-33.	1-3
A	US 3661154 (TORR) see column 1 lines 4-15; column 3 lines 6-29; column 5 lines 2-4.	
A	US2688586 (EBERL ET AL) see whole document and in particular column 1 lines 1-2 and 28-31; column 2 lines 5-13; column 4 lines 4-6 and column 5 lines 20-22.	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.



**Application No:** GB 0116438.3  
**Claims searched:** 1-6

**Examiner:** Dr R.A. Lewis  
**Date of search:** 24 January 2002

Category	Identity of document and relevant passage	Relevant to claims
Y	US2512616 (EBERL ET AL) see whole document.	1-3

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.